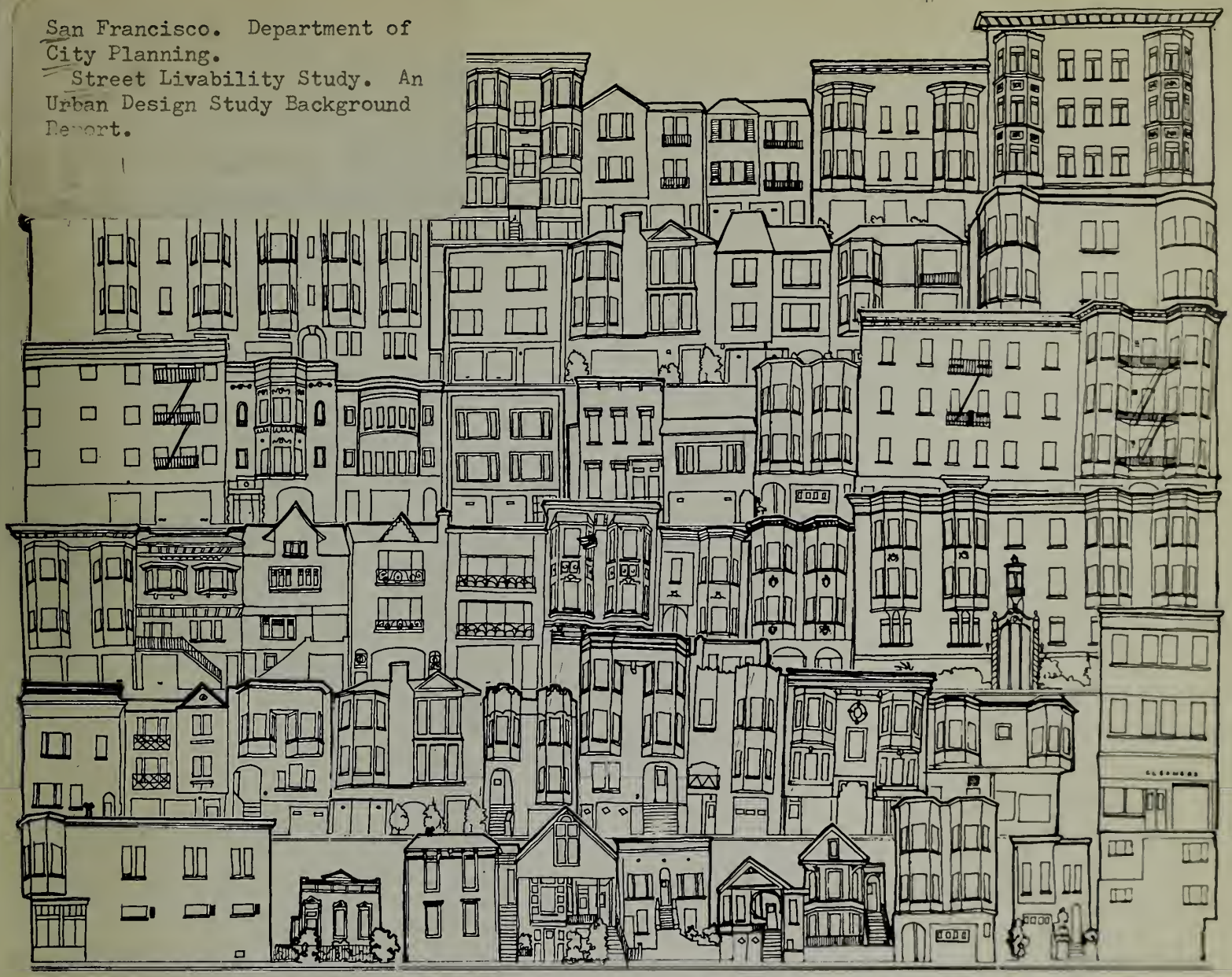

SAN FRANCISCO DEPARTMENT OF CITY PLANNING

STREET LIVABILITY STUDY

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An Urban Design Study Background Report

Donald Appleyard, Consultant

San Francisco Department of City Planning June, 1970

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PREFACE

During the first months of the San Francisco Urban Design Study, a citywide survey was conducted of the quality of environmental conditions. As part of this block-by-block survey, streets were identified where traffic volumes were considered to have an adverse effect on adjacent residences. Because the resulting pattern was extensive, a more detailed study was initiated to determine the effects of different street traffic volumes on the quality of residential areas.

Professor Donald Appleyard, of the University of California at Berkeley, a consultant to the Urban Design Study, was asked by the Department of City Planning to undertake a more intensive investigation, answering the following questions:

1. What aspects of traffic causes the greatest discomfort to residents?

2. At what level of traffic volume do streets cease to be pleasant, attractive, residential streets?

3. What are the criteria for a good, residential street and, conversely, for measuring the relative seriousness of traffic-generated problems?

4. How can these problems be corrected or ameliorated?

The findings of this study are presented in this special summary report on "Street Livability". They are intended to provide the Department and concerned citizens with a much better understanding of the effects of traffic conditions on the city's residential streets.

SUMMARY

During the first months of the San Francisco Urban Design Study, a complete survey was conducted of the quality of environmental conditions. In part of this block-by-block survey, streets were identified where traffic volume were considered to have an adverse effect on pedestrian conditions. Because the resulting pattern was disturbing, a more detailed study was initiated to determine the effects of traffic, about traffic volumes on the quality of residential areas.

Professor Donald Appleyard, of the University of California at Berkeley, a consultant to the Urban Design Study, was asked by the Department of City Planning to undertake a new, original research, concerning the following questions:

1. What impact of traffic causes the greatest discomfort to residents?

2. At what level of traffic volume do citizens begin to be bothered, adversely, by residential disorder?

3. Does the existing City Zoning for a good, residential street and, secondarily, for measuring the relative seriousness of traffic conditions reflect

4. How can these problems be corrected or ameliorated?

The transportation study was organized in this special summary report on "Street Liveability". They are intended to provide the Department and concerned citizens with a more detailed understanding of the effects of traffic conditions on the city's residential streets.

I. INTRODUCTION AND SUMMARY OF FINDINGS

THE PROBLEM

If the flow of traffic is slowly increased in a quiet, residential street, significant changes can often be observed.

An increase in traffic volume is accompanied by an increase in traffic noise, fumes and vibrations. Traffic accidents are more likely to happen. With introduction of more and faster-moving traffic, parking becomes a more hazardous task, parking spaces difficult to find. There tends to be less pedestrian activity in and along the street. Passing traffic inhibits car washing, street conversations and children's play. People cease to use the sidewalks as a meeting place. Visiting across the street diminishes. People are not as likely to leave bicycles, toys or sidewalk furniture in front of their houses or to put in window boxes and planting for fear of their being stolen or vandalized by the large number of strangers passing by in their cars.

Interest in the street diminishes. It becomes something to be screened out of most daily activities -- an intruder. The block's identity changes from being an extension of people's living spaces to a traffic corridor.

Families with children often move from the street to other areas. Houses may be divided into apartments. As the number of transients and renters increases, interest in the block and in street social life declines. Social life and activity turn away from

V. INTERSECTIONS AND MOVEMENT OF PEDESTRIANS

A. BACKGROUND

In our flow of traffic is slowly increased in a quiet, revolutionary manner, significant changes can often be observed.

An increase in traffic volume is accompanied by a increase in traffic noise, fumes and congestion. Traffic accidents are more likely to happen. With introduction of more and faster-moving traffic, motion becomes a more tedious task, parking spaces difficult to find. There seems to be less pedestrian activity in and along the street. Formally sociable individuals cease conversations and children's play. People cease to use the sidewalks as a meeting place. Walking errands are direct and minutes. People are less apt to linger in shopping, toys or elaborate furniture in front of their homes or to put in window boxes and planting for fear of their being stolen or vandalized by the large number of strangers passing by in their cars.

Indeed in the "Age of Automobile" it becomes commonly to be regarded not of most daily activities -- as intrusive. The block's identity changes from being an extension of people's living room to a traffic corridor.

Traffic with multiple-lanes cuts from the street to other areas. Areas may be divided into quarterings. As the number of transients and renters increases, interest in one block and in street social life declines. Social life and activity turn away from

the street. Neighbors and traffic noises are screened out with equal determination.

This process is occurring on many streets in San Francisco. As in other cities, more efficient movement of traffic is a major concern of San Francisco street improvement programs. Changes in the street system are primarily made to accommodate the needs of increasing numbers of vehicles. Two-way streets, for example, are changed to one-way. Streets are widened, and their sidewalks narrowed. Each new "improvement" increases street capacity and may increase driving speeds as well. The demand appears to increase with each improvement and traffic problems spread throughout the city in an increasingly complex network.

In deciding traffic policies, the concerns of residents along the affected streets sometimes take second place to the problem of moving vehicles. Perhaps this occurs because traffic problems are clearly defined and easily perceived, whereas the effects of traffic on residential streets occur over a number of years and cannot be easily seen or measured. The San Francisco City Planning Department decided to find out what is really going on. What kinds of effects does the traffic actually have on street livability?

THE "LIVABLE" RESIDENTIAL STREET

Before the study began, the qualities of a livable residential street were described. Why is one kind of street more pleasant to live on than another?

Most people will probably agree that a good, livable street is safe at all times for residents and strangers, young and old people alike. Noise, vibration, fumes or poor lighting do not become excessive and disturb people living or walking along it. A livable street is free of trash. People take pride in keeping it clean. They feel that the street is their home territory -- that it "belongs" to them.

A livable street may have a sense of being a special, interesting street -- different from others. It probably has some trees on it and a variety of architecturally interesting buildings.

People are able to make adjustments and changes to a livable street. They may plant flowers, shrubs or trees, construct fences or walls or improve the street in other ways. These things are possible in the suburbs. Why should they not be possible in the city?

The resident's right to be left alone and his private domain are respected; yet people can visit with each other comfortably along a livable street. A feeling of community develops. This sense of community improves residents' capabilities for self-protection against intruders -- against unwanted strangers, unwanted public agencies and private developers with "plans" for the street. As a cohesive unit, a local organization often has a strong voice in city government and, as a result, an increased sense of security.

METHOD OF STUDY

This report focuses on parallel blocks along three residential streets. Residents on the blocks are people of similar social and economic status; but the streets carry different volumes of traffic. One is a lightly trafficked street (2000 vehicles per day), another a moderately trafficked street (8000 vehicles per day), and a third, a heavily trafficked street (16,000 vehicles per day).

The survey blocks were selected from a larger group studied. This larger group includes another set of three residential blocks with traffic volumes similar to the others and a major arterial of 50,000 vehicles per day. Findings from interviews and observations on these streets generally supported those made on the three streets that are the subject of this report. There are some differences. These are due, in part, to differing social and economic conditions and to physical features that modify residents' views of their streets, such as a heavily landscaped median strip or a street car line.

People who live along the three blocks selected for detailed study were interviewed to find out how they feel about their streets -- to find out what they like and what they want to see changed. They drew maps of their streets and indicated where they think problems are. The interview was designed to determine the effects, if any, of traffic on the quality of life along the streets -- the livability of the streets. People in the survey

across the board.

This report focuses on mentally ill people living outside institutional settings. Residents on the streets are generally of varying mental and economic status; but the streets being different matters to mentally ill. One is a highly trafficked area, lacks sanitary facilities, another a relatively trafficked area, lacks sanitary facilities, and a third a highly trafficked area, lacks sanitary facilities per day.

The survey models were extracted from a large study conducted. This larger study included medical and of these psychiatrically ill people with family problems relating to the subject and a major attempt of 18/19 subjects had died. Interviews from interviews and observations on these streets usually supported these findings of the three interviews that are the subject of this report. Those are such differences. There are, for part, a difference in social and economic conditions and in physical treatment that really reflected views of their streets, such as a highly institutional medical clinic or a street has line.

People who live along the three streets subjected for difficult study were interviewed in time one and they had gone through stages - in time one that they were in the hospital and to the charges. They have been of local streets are interested where they lived previous lives. The interviews are managed or interviewing the effects, it may be of traffic or the dealing of life times in streets - the friendliness of the streets. People in the survey

were each asked over a hundred questions during an interview which was very carefully constructed to avoid bias. The sample of people interviewed was small (about 80) and the survey techniques were simplified to generate basic information on people's attitudes toward the effects of traffic. Approximately twelve people on each block were interviewed. Care was taken to balance the sample with equal numbers of elderly, middle-aged and young people.

A number of observations were also made of traffic conditions and noise levels at different times of day, on different days of the week. These are backed up by official data on traffic volumes.

DESCRIPTION OF THE STREETS

The three blocks this report focuses upon are typical of many streets in San Francisco. Houses or apartments lie solidly along either side of the street. They are well-maintained buildings of architectural styles ranging from Victorian to modern. The buildings are mostly from two to four stories high. There are not many trees or front yards. The streets run north-south, with a slight gradient to the south, where they run up a steep hill.

On the Heavy Traffic Street are mostly 12- to 18-unit apartment buildings. There is a mixture of two- to four- and six- to twelve-unit apartment buildings and single-family houses on the Moderate Traffic Street. On the Light Traffic Street are single-family houses and two- to three-unit apartments.

were used based over a predicted questions making an interpretation. This was very particularly concentrated in Quiet Site. The sample of people interviewed was small (about 100) and the survey results were simplified to generate basic information on respondents' attitudes towards the attitude of traffic. Approximately seven people on each block were interviewed. [illegible] the sample with equal numbers of male [illegible] and young people.

A number of observations were also made of traffic behaviour and noise levels at different times of day, on different days of the week. These are backed up by official data or research evidence.

Description of the Problem

The three blocks into Copper Street have the appearance of being accessed by non-residents. Drivers by-passing the quietly alone either side of the street. They are half-concealed behind residential styles leaving from Hillsville to Westbury. [illegible] buildings are usually from two to four storeys high. Shops are not down areas or front yards. The shopping are [illegible], with a [illegible] conditions by the south, where they rise to a stood [illegible].

On the busy traffic flows are mostly 18- to 25-year old [illegible] boyfriends. There is a mixture of [illegible] and the [illegible] and quarterness buildings [illegible] almost-[illegible] [illegible] traffic [illegible]. On the busy traffic [illegible] [illegible] [illegible] and [illegible] [illegible].

Traffic flow is two-way on Light and Moderate Traffic Streets and one-way on Heavy Traffic Street. It travels at 15-20 miles per hour on Light Traffic Street, 25 miles per hour on Moderate Traffic Street and 35-40 miles per hour on Heavy Traffic Street.

Heavy Traffic Street carries overflow traffic from a major thoroughfare (37,000 vehicles per day) located one block to the east. Traffic signals are located at both ends of the block. Traffic crossing the Moderate Traffic Street is regulated by stop signs at the north end of the block. Stop signs are also located at the north end of the third block, regulating traffic along Light Traffic Street.

THE STREET RESIDENTS

The blocks are in a formerly Italian neighborhood. The people living there are mostly white-collar workers who have completed high school and a year or two of college. (Other surveys were taken in Spanish-American neighborhoods.)

There are some differences in the types of people living on the three streets. Light Traffic Street is predominantly a family street, with many children. People who grew up on the street are even returning to raise their own families. People who were interviewed mostly own their homes and have lived there an average of 14 years.

Heavy Traffic Street, on the other hand, has no children living on it. Its residents are predominantly single. There are many

Traffic flow is heavy on light and moderate traffic streets and average on heavy traffic streets. It ranges in light miles per hour on light traffic streets, 20 miles per hour on moderate traffic streets and 23-25 miles per hour on heavy traffic streets.

Heavy traffic streets carries average traffic from 1 major thoroughfare (17,000 vehicles per day) toward one block in two ways. Traffic signals are located on either end of the block. Traffic crossing the Concrete Traffic street is regulated by stop signs on the North and at the corner. Stop signs are located at the North and at the South block regulating traffic along Main Traffic Street.

The Effect Environment

The Queen Ann is a Primary Zoning Neighborhood. The people living there are mostly middle-class working and have completed the school and types of work of society. Under survey were based on Land Occupation questionnaire.

There are some differences in the type of people living in the three streets. Upon Traffic Street is predominately a land/tenant with very children. Small was said to be the school was attending to raise condition families. People who were interviewed mostly was Chase Lease and have lived there an average of 14 years.

Heavy Traffic Street, on the other hand, has homeowner living in it. The residents are predominately elderly. Their ex-army

old people. Most people on the block rent apartments and have lived there an average of 7.6 years.

The people who live on Moderate Traffic Street are a mixture of families and single people, renters and owners. The average length of residence on the block is 8.3 years.

SUMMARY OF FINDINGS

1. For the three streets studied:

   People reacted differently to traffic on each of the three streets.

   Their responses fell within five general categories:

   a. Traffic hazard is of primary concern to residents on all streets surveyed.

      The problem is most acute on Heavy Traffic Street where constantly large volumes and fast speed of vehicles pose both a physical threat and a nagging inconvenience to street residents.

      Sporadic hot-rodders, appearing without warning on Light Traffic Street, were cited as being extremely dangerous for children who play in the street.

      Conditions on Moderate Traffic Street lie in between -- at rush hours tending toward those on Heavy Traffic Street and during the rest of the day toward those on Light Traffic Street.

   b. Considerable suffering results from the noise, stress and pollution of increasing amounts of traffic.

      Vibration, trash, fumes, noise and soot were all cited as irritations -- the severity of the problems they represent increasing sharply from Light Traffic Street to Heavy Traffic Street.

[illegible] [illegible] people in the [illegible] [illegible] and low [illegible] [illegible] [illegible]

c. Neighboring and visiting among street residents diminishes as traffic increases.

Few people stop to visit with one another on Heavy Traffic Street. Residents do not have many local friends or acquaintances. Very little neighboring occurs across the street.

Light and Moderate Traffic Street residents have many more friends or acquaintances both across and along their streets. They stop to visit with one another along the sidewalks, on the front steps or in the street itself.

d. As traffic increases, people regard their street less as their home territory and more as a public, impersonal place.

Traffic is considered an invasion of privacy and causes people on Heavy Traffic Street to withdraw from the street as much as possible -- to screen it out.

People on Light Traffic Street and, to a lesser extent, on Moderate Traffic Street, feel pride in and responsibility for their streets. A good balance is achieved between household privacy and a spirit of community centered around the street.

e. The street's visual identity becomes less rich and residents' interest in its detailed features diminishes with increased traffic volumes.

People identify Heavy Traffic Street as a monotonous, continuous traffic corridor.

Moderate Traffic Street also has a strong traffic corridor identity, but people are aware of and show more interest in details -- individual driveways, crosswalks, lane markings and some building forms.

Light Traffic Street residents are able to identify many smaller-scale street elements -- planting, individual buildings, specific cars belonging to friends, front stairways, even a manhole -- as important features of their street.

The areas of traffic hazard, stress, pollution, neighboring and territoriality are of foremost concern to the people interviewed. Identity and interest are not considered to become important until problems in the former areas are ameliorated.

2. For residential streets in general:

The general trend is toward increased traffic on each of the three streets studied. Unless a stand is taken, conditions on these streets -- and on streets like them all over San Francisco -- will deteriorate. It is appropriate, then, to draw some general conclusions about the effects of traffic on residential streets:

The environmental quality of residential streets tends to deteriorate with increased traffic activity.

- Increased traffic activity is associated with a decrease in the desirability of streets for families with children. A shift from single-family homes to apartments is often a consequence.

- Increased traffic is associated with a drastic decrease in social interaction and street activity. A quiet street with little traffic, with families, etc., is more likely to promote a rich, social climate and a strong sense of community.

- Increased traffic is associated with a withdrawal from the physical environment. The street with low traffic shows evidence of acute (and critical) awareness of and care for the physical environment.

II. DESCRIPTION OF FINDINGS

The effects of traffic on the residential streets studied for this report fall within five distinct areas of concern: traffic hazard; noise, stress and pollution; neighboring and visiting; home territory; and identity and interest.

This part of the report discusses each of these areas of concern. The discussions include a description of the findings and comment on how they were obtained. Quotes from the people interviewed are used to illustrate relevant points. A summary map is presented for each area, showing traffic volumes, building facades along the blocks studied and appropriate diagrams indicating the study's findings, illustrated with quotes from people interviewed.

A. TRAFFIC HAZARD

Danger from traffic is of concern to residents of all three streets.

Observations were made of actual traffic speeds on the three blocks. Information on legal speed limits and on 24-hour and peak hour traffic volumes were obtained from the Department of Public Works. Specific accident data were not available for these blocks, but several minor accidents were observed during the course of this study and others were mentioned by people interviewed. The interview included questions to determine how safe people consider their streets to be, such as:

-- Is it ever dangerous on your street and around your home? If yes, what makes it so?

-- Where is traffic worst in this neighborhood? When?

-- What is traffic like on this street -- how would you describe it?

The Findings:

Heavy Traffic Street is a one-way street carrying as many as 1900 vehicles per hour during peak periods. Synchronized stop-lights at both ends of the block enable groups of vehicles, having already gained momentum from traveling downhill, to travel through at speeds up to 45 miles per hour -- almost twice the legal speed limit of 25 miles per hour. The average observed speeds on this block are 35-40 miles per hour, also well above the legal limit.

"Traffic is heavy and fast -- the fastest in the neighborhood."

"Traffic is fast -- the signals are set fast."

The fast speeds and heavy volumes make the street unsafe for children's play and for other street activities.

"You cannot wash your car on the street for fear of being knocked down. If water is sprayed on passing cars, people get very angry."

People say that getting into parked cars and out of driveways is a dangerous operation, involving careful timing on Heavy Traffic Street. It is unsafe to get into parked cars from the traffic side except between signal changes. Since the sidewalks are narrow (8'6" wide), backing out of a garage that fronts on the sidewalk means that the average American car (approximately 18-20 feet long) extends past the sidewalk into the street. The owner has to back out of the garage, leap from his car to close the garage door, get in again, back his car into the street and drive off between signal changes or cause tie-ups and the danger of an accident.

"It's dangerous coming out of the driveway and having to turn in front of the pack coming down the street."

Traffic along Heavy Traffic Street also represents an implied danger to residents. They hear brakes screeching and wait for the sound of a collision. The sight and sounds of heavy, fast-moving traffic make them uneasy on the sidewalks. The threat of an accident is always there.

"I couldn't relax outside on the street with the traffic."

"Traffic is heavy and fast -- the people in the neighborhood.

"Traffic is fast -- the animals had not been."

The fast moving and heavy vehicles make the street unsafe for children's play and for other street activities.

"You cannot walk your car on the street for fear of being run-over too. It makes it difficult on children, people get very angry."

Public and private parking area behind cars and out of driveways is a disastrous operation, involving complete blocking on heavy traffic arteries. It is unsafe to get into parking cars from the traffic side because of vehicle damage. Since the sidewalk area (11'6" wide), backing out of a parked car from on the sidewalk means that the average location can (approximately 16'30 feet long) extend past the sidewalk into the street. The owner has to back out of the garage, then turn his car to face the street, get in motion, then his car into the street and drive off backing signal changes of cause blocking and the danger of an accident.

"It's dangerous coming out of the driveway and having to - turn in front of the cars coming down the street."

Traffic noise from heavy traffic flows also represents an implied danger to residents. They have trouble entertaining and visit because the sound of a conversation. Pedestrians and occupied heavy, fast-moving traffic make them uneasy on the sidewalks. The threat of an accident is always present.

"I personally resign outside on the street with the traffic."

The continuous presence of strangers on Heavy Traffic Street, even though they are in automobiles, evinces some feelings of fear. One young housewife has frequently been harrassed by passing cars and some of the older ladies say they are afraid to stop and chat.

Light Traffic Street, which has only a small amount of through traffic, has problems of a different nature. Because the street has little traffic, it tends to attract occasional hot-rodders who can be a greater menace than a steady stream of traffic. The hot-rodder appears without warning, often jumping stop signs, and is extremely dangerous for children playing along the street.

Another problem on a street which seldom requires strict traffic control is the temptation to park where it is immediately convenient. On Light Traffic Street, trucks often park on the corner when making deliveries to the grocery, blocking motorists' view down the cross street.

The situation on Moderate Traffic Street lies in-between -- at peak hours tending toward that on Heavy Traffic Street and at off-hours toward that on Light Traffic Street. Because there are children living on the street, the heavy, peak hour traffic is especially dangerous.

> "It's a busy street, with freeway traffic coming through. I don't trust the children to stay on the sidewalk."

As on Heavy Traffic Street, the traffic implies a threat to residents' safety. Over half of the people interviewed complained

The continuous presence of strangers on busy traffic streets, even though they are in automobiles, actually does "relieve" of fear. The young housewife has frequently been warned by parents and more of the older ladies say they are afraid to stop and chat.

Light traffic streets, which has only a small amount of through traffic, has problems of a different nature. Because the street has little traffic, it tends to attract "undesirables" who feel they can be a greater nuisance when a street consists of residents. The behavior appears obvious enough, street loitering, congregating and is extremely conducive to children playing which has proved

Another problem on a street which sees little traffic is the tendency to park where it is inconvenient and unsafe. On light traffic streets, trucks often park on the corner when making deliveries to the grocery, blocking motorists view down the cross street.

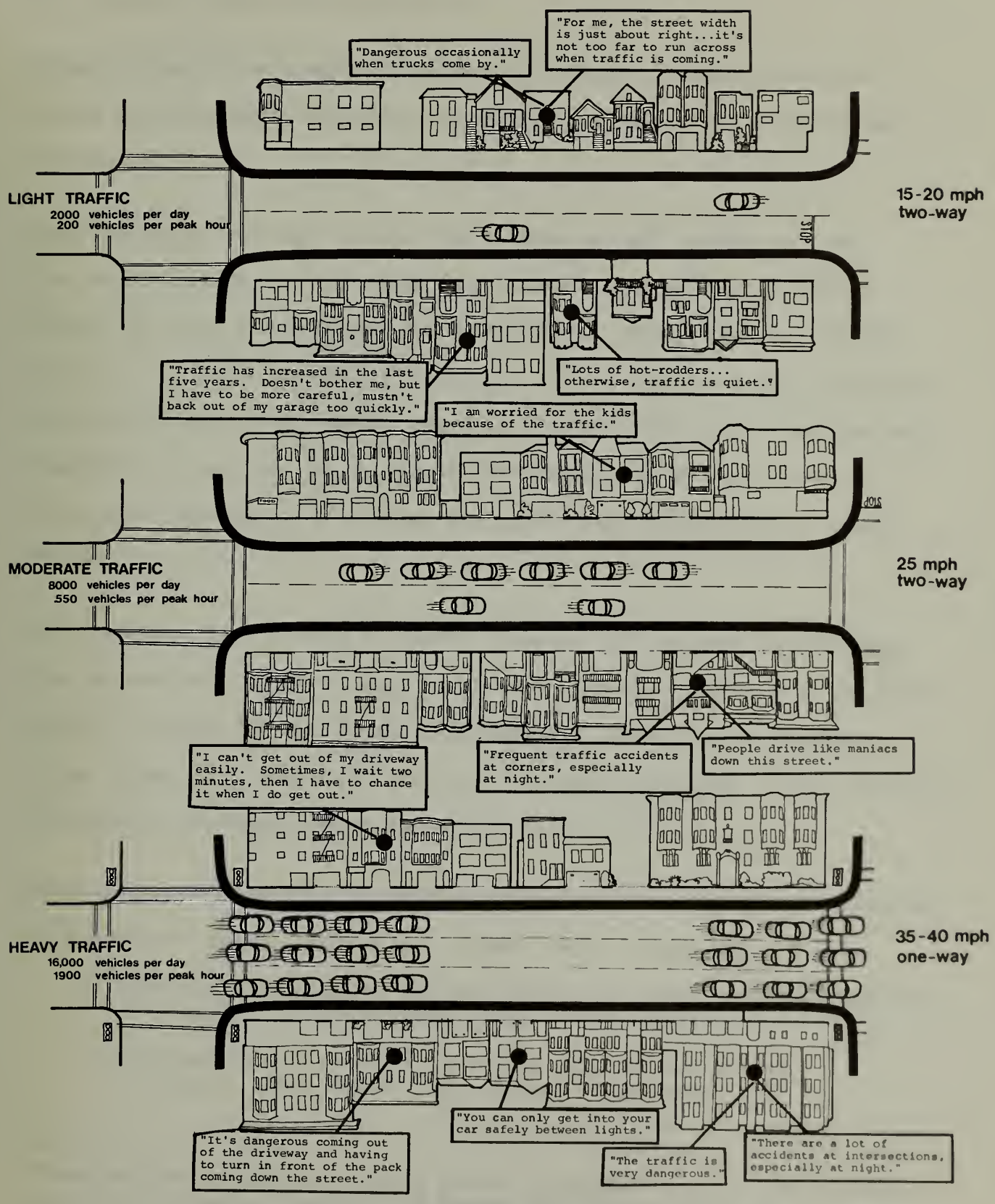
The situation on moderate traffic street lies in-between -- at least there is enough traffic on busy traffic street and at all hours to make that a light traffic street. Because there are children living on the street, the busy, fast moving traffic is especially concerning.

"It's a busy street, with heavy traffic coming through. I don't think the children is safe on the sidewalk."

As a busy traffic street, the traffic facilitis a threat to residents' safety. Some half of the people interviewed indicated

of traffic accidents, near-accidents and screeching brakes (as opposed to one-third of the people interviewed on Heavy Traffic Street). Since there are children to worry about; since the volume and speed of traffic varies with the time of day; and since there is more pedestrian activity along the street, the potential danger from traffic is a matter of much concern.

STREET LIVABILITY STUDY: A SURVEY OF HOW RESIDENTS VIEW THEIR STREETS



TRAFFIC HAZARD

B. NOISE, STRESS AND POLLUTION

After danger from traffic, noise, vibration, fumes, soot and trash are the most stressing aspects of traffic on these three streets.

Measurements of noise levels were made on all three streets. The noise levels were determined through use of Sound Survey Meters at four periods during a weekday: early morning (6:30-8:30 a.m.), late morning (11:00 a.m.-12:30 p.m.), late afternoon (5:00-6:00 p.m.) and early evening (7:00-8:00 p.m.). During each measurement period, 50 consecutive measurements were made at 15-second intervals at corner and mid-block locations on each street.

To translate these into a useful measure of average conditions, the percentage of time that the noise exceeded certain A-weighted decibel levels (db(A)) were calculated. From this a Traffic Noise Index[1]-- a standard measure of noise problems -- was derived to predict probable dissatisfaction due to noise.

The interview included questions to determine people's reactions to traffic's noise, vibration, fumes, etc., such as:

-- Are you bothered at all by dirt...by pollution...by smells ...glare? (If yes) How much? What from?

-- Are you ever troubled by noise and/or vibration? (If yes) What from? How often? How bad?

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[1] "Subjective Response to Road Traffic Noise", by I.D. Griffiths and F.J. Langdon, Journal of Sound and Vibration, Vol. 8, No. 1, July, 1968, pp. 16-32.

D. Noise, Speed and Pollution

Noise Danger from traffic, noise warning, Tones, horns and sirens are the most attracting warnings of traffic or other noise sources.

Loudness of noise levels were made in all three situations. The noise levels were determined through use of sound survey meters at four points during a monday. Only morning (6:00 a.m.), late morning (11 00 a.m.) and early evening (5:00 p.m.). During each measurement period, 20 successive measurements were made at 15-second intervals at noise, and minimum locations on each street.

To tabulate these data, a total number of various conditions, the determination of that the noise recorded results from different levels (dB) were obtained. From this a traffic noise index - a statistic measure of noise problems — was derived to predict people's dissatisfaction (or to noise.

The interview included questions to determine people's reactions to traffic's noise, vibration, fumes, and such as:

- Are you bothered at all by dirt, the pollution, by smells (odors) (if yes) (the dirt, odor, fumes)

- Are you ever bothered by fumes and/or vibration? (if yes) "What first has alarmed you most?

"Subjective Response to Road Traffic-Noise", by Ian Griffiths and F.I. Langdon, Journal of Sound and Vibration (vol. 8, no. 1, July, 1968), pp. 16-32.

The Findings:

On Heavy Traffic Street, the noise is so severe that many people's opinions of the street revolve entirely around the stress it causes. Older people living along Heavy Traffic Street are especially bothered by the noise. One elderly couple is forced to try to catch up on sleep during the day.

> "I am troubled by traffic noise -- mostly trucks and motorbikes. The street acts like an echo chamber. It continues day and night."

> "There is too much noise from traffic. It's getting unbearable. They sit, turning over, at traffic lights, then roar off when the lights change."

> "People have moved because of the noise."

Often, the individual or minority use creates the most disturbance. The majority of cars are reasonably quiet and pass at a smooth, even pace. The real offenders are sports cars, motorcycles, Volkswagons, buses and trucks. The steady drone of traffic is bad enough; but the roar of frequent buses and large trucks, with accompanying vibrations that rattle every window, unnerves even the most hardened resident, especially when it continues day and night. The screeching of brakes at intersections adds to the distress.

> "Traffic coming from the freeway, empty Muni buses, school buses and Greyhound buses -- they come in herds. Huge trucks as well. This goes on day and night. Army Presidio buses make more noise than anything else."

Residents on Heavy Traffic Street petitioned for a sign prohibiting trucks and buses. The sign was installed, but it fails to mention buses. It is small and the color blends with its

background; so it is not easily seen. In any case, the law is not enforced. Truck drivers have learned that they may continue on their way with impunity.

On Heavy Traffic Street, the noise levels are so high that the Traffic Noise Index reads off the scale. Noise levels measured are above 65 decibels[1] for 45 percent of the time and do not fall below 55 decibels more than 10 percent of the time except in the early morning. The character of noise on the street is uneven due to the waves of cars that flow down the street, and to the occasional noisy vehicle which exceeds 70 decibels.

The condition and cleanliness of the buildings on Heavy Traffic Street is generally high. Maintenance and clean appearance are clearly important to all the residents. Heavy Traffic Street is constantly on display to outsiders traveling through it. Owners of the buildings are careful to maintain a high standard of cleanliness despite trash and dirt from the street. The appearance of a quality environment is therefore maintained. The street does not encourage people to be outgoing, however, and they are reluctant to accept responsibility for the street itself. They avoid picking up trash and are slow to defend the

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[1]The maximum noise level in dwellings should be no more than 50 decibels during the daytime and 35 decibels during the night, for more than 10 percent of the time. Assuming that open windows reduce noise levels by 10 decibels and closed windows by 20 decibels, then street noise should not be above 60 decibels and 45 decibels for open windows or above 70 decibels and 55 decibels for closed windows, over 10 percent of the time.

street against vandalism and abuse.

"It's absolutely disgusting the amount of litter there is."

On Moderate Traffic Street, concern for trash, dust and soot are more pronounced than on Heavy Traffic Street.

"I feel helpless as far as traffic is concerned. I can never finish cleaning."

"It's getting worse because of traffic -- getting dirtier. The rot has set in."

This street is going through a difficult stage. Traffic and traffic problems are increasing; yet, there is no clear distinction between public territory, which is the responsibility of the city, and local territory, which is the responsibility of the residents.

People have been observed dumping the contents of ashtrays and beer cans into the gutter. Even so, Moderate Traffic Street is seen as a good, respectable place to live. Sidewalk maintenance has helped to keep up the quality of the street.

"It's a dirty street. I have to be a janitor and sweep the street."

Noise problems on Moderate Traffic Street definitely take second place to those of dirt and trash. Sound levels measured are above 65 decibels for 25 percent of the time. By the Traffic Noise Index, it is rated as "definitely unsatisfactory".

On Light Traffic Street, the quietest of the three, sound levels rise above 65 decibels only 5 percent of the time. On the Traffic Noise Index, this means that one half the residents

consider it "unsatisfactory" and one half, "satisfactory". The noises people complain of are occasional trucks, hot-rodders and motorcycles that interrupt an otherwise quiet street.

> "I'm sometimes bothered by the noise of an occasional big truck which will wake the baby."

Light Traffic Street is seldom seen by outsiders, so the quality of street maintenance is a local matter. People say that the street is changing and that they notice signs of deterioration.

> "The quality of the street is getting better in that people take great care of their properties, but worse in that there is more traffic and more cars on the street."

Many residents take an interest in looking after the cleanliness of the street. Some have planted trees in front of their houses.

The lack of available parking spaces is mentioned frequently as an inconvenience. Many suburban commuters and users of the nearby shopping center park on the street, taking up residents' parking spaces.

> "There are parking conflicts. Parking is a pain because outside people put their cars in the driveways."

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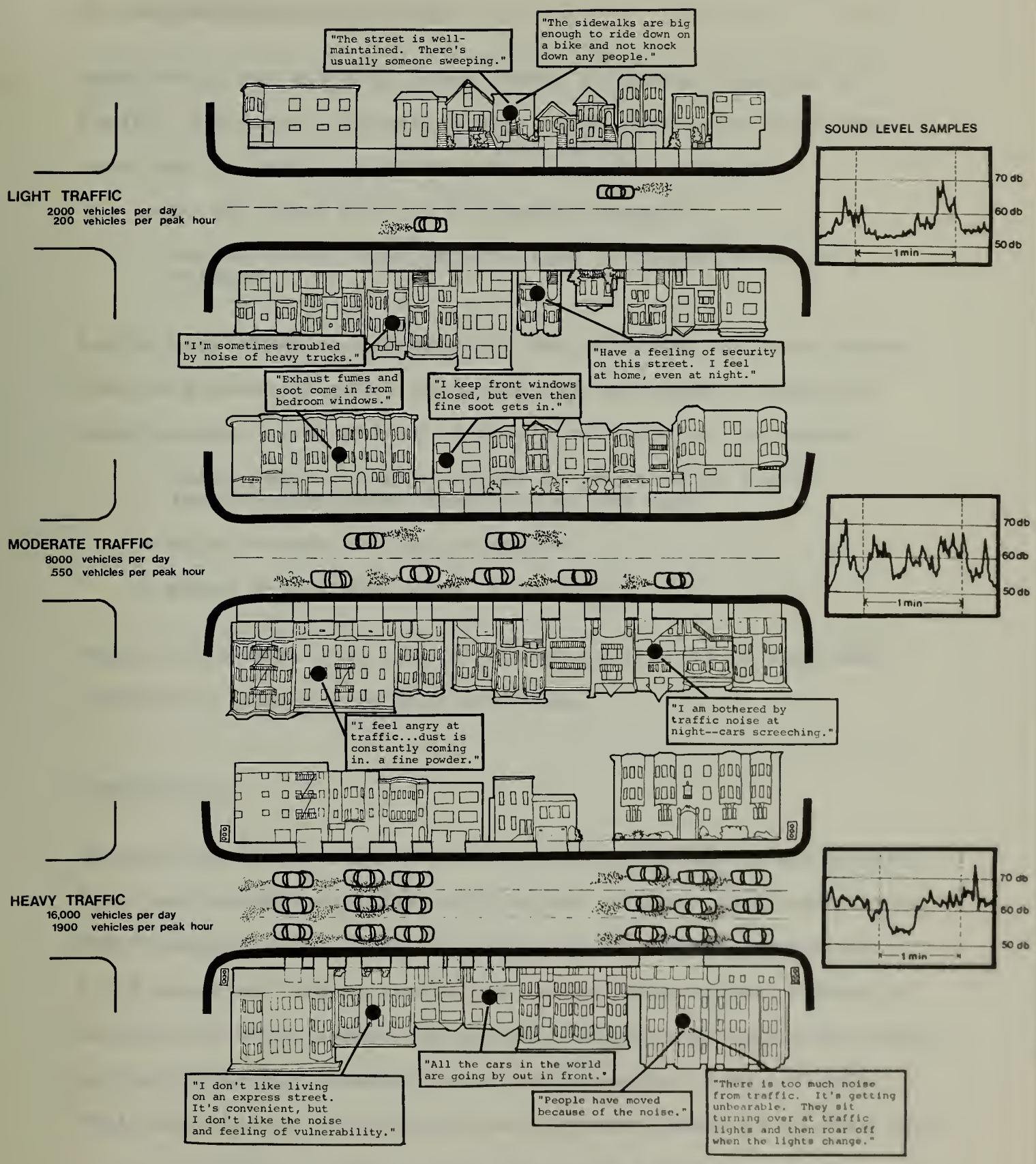
STREET LIVABILITY STUDY: A SURVEY OF HOW RESIDENTS VIEW THEIR STREETS



NOISE, STRESS AND POLLUTION

C. NEIGHBORING AND VISITING

Neighboring and visiting among street residents declines as traffic increases. Questions were asked during the interview about the friendliness of the three streets, such as:

-- Do you think this is a friendly street?

-- Do you think there is a feeling of community on this street?

People were shown a photograph of the buildings on their street. They were asked to point out where any relatives, friends or acquaintances lived and where people gathered on the street:

-- Which people on this street do you know by sight? (mark houses where they live on the map)

-- Which houses have you visited?

-- Where do children play, if at all?

Observations were also made of street activities to supplement information gained from the interviews.

The Findings:

On Heavy Traffic Street, there is very little social interaction. It is not considered a friendly street. People interviewed have few friends or acquaintances living on the street, averaging 4.2 friends and acquaintances per person interviewed. There is not much visiting across the street. A sense of loneliness comes out very clearly, especially in the responses of the elderly. Their socializing is inhibited more by the amount of traffic than

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-- Do you think this is a friendly street?

-- Do you think there is a feeling of community on this street?

People were shown a photograph of the building or block front. They were asked to point out where any relatives, friends or acquaintances lived and where people gathered on the street.

- Which people on this street do you feel by sight have houses where they live on the map

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that of any other age group. They lack the mobility of middle-aged and young people and have fewer opportunities for making friends.

"I wish there were more young people here."

"It's not a friendly street -- no one offers help."

Heavy Traffic Street has very little sidewalk activity. It is used by residents only as a corridor between the sanctuary of individual homes and the outside world. People keep to themselves. There is little or no feeling of community.

On Moderate Traffic Street, there is a feeling that the old social community is nearing extinction.

"It used to be friendly; what was outside has now withdrawn into the buildings. People are preoccupied with their own lives."

"It is an in-between street with no real sense of community."

The average number of friends and acquaintances per person interviewed (5.4) is only a little higher than on Heavy Traffic Street.

The sidewalks are used more heavily than those along Heavy Traffic Street. A group of old men gather frequently outside the corner store. Children and some teenagers play along one side of the street. There is more visiting across the street than on Heavy Traffic Street; although no one uses the street itself for play or visiting. A boundary is still felt between pedestrian and vehicular traffic areas.

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"I wish there were more young people here."

"It's not a friendly street -- no one cares much."

Heavy traffic moves has very little through activity. It is used by residents only as a corridor between the centrally located business and the outside world. People keep to themselves. There is little or no trading or conversing.

On Lafayette Traffic Street there is a feeling that the old social community is losing cohesion.

"It used to be friendly. When one moved in, one was welcomed into the neighborhood. People are preoccupied with their own lives."

"It is an in-between street with no real sense of community."

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The situation per cent more heavily when people along heavy traffic street. A group of old men gather regularly outside the corner store. Children and young teenagers play along one area of the street. There is very visiting across the street than on heavy traffic streets although no one uses the street itself for play or visiting. A boundary is still felt between pedestrian and vehicular traffic areas.

On Light Traffic Street, people interviewed have three times as many local friends and almost twice as many acquaintances as those in Heavy Traffic Street. They totaled an average of 9.1 friends and acquaintances per person. Social contacts across the street are extensive. This friendliness is related not only to the small amount of traffic but also to the larger number of children and to the longer residence of people on the street.

> "Everybody knows each other."

> "I feel it's home. There are warm people on this street. I don't feel alone."

Though people generally use the sidewalks, children and teenagers often play games in the street itself. Children also play on the sidewalks, which are wider than those on Heavy Traffic Street.

> "The sidewalks are big enough to ride down on a bike and not knock down any people."

A corner store acts as a magnet for old and middle-aged people. A tennis store across the road attracts a small group of young adults. Front porches and steps are used for sitting, talking with friends and for children's play. The street is seen as a whole and no part is out of bounds. It is used fully.

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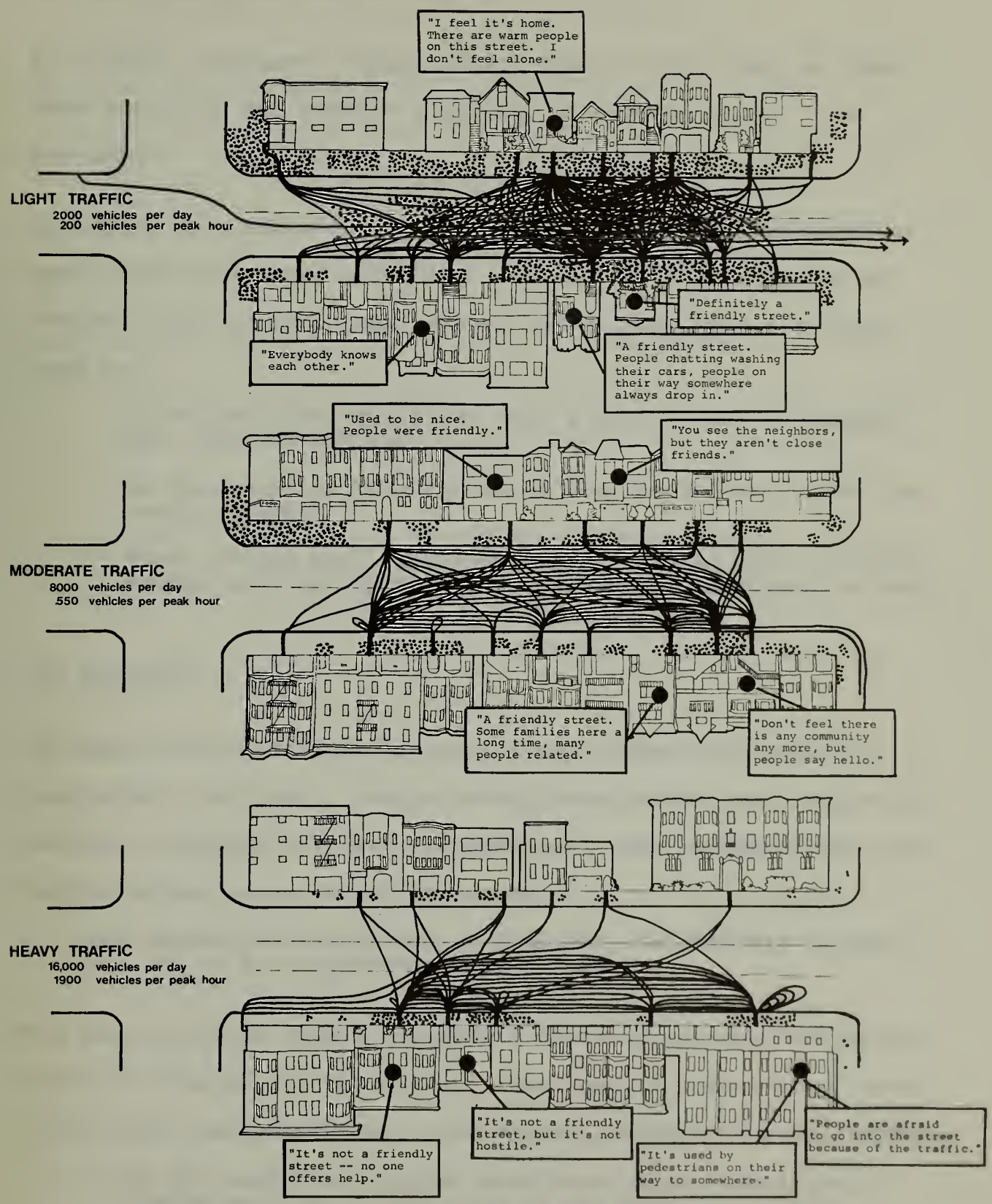

NEIGHBORING AND VISITING

LINES SHOW WHERE PEOPLE SAID THEY HAD FRIENDS OR ACQUAINTANCES

DOTS SHOW WHERE PEOPLE ARE SAID TO GATHER

D. HOME TERRITORY AND PRIVACY

As traffic increases, people regard their street less as their home territory and more as a public, impersonal place -- an intrusion.

Questions were asked during the interview to determine whether people feel they have sufficient privacy on their streets and whether they consider their street to be their home territory, such as:

-- If an outsider criticized your street, would you defend it? Why, or why not?

-- Do you think of this street as your real home, where you really belong?

-- Where do you feel that your "home" extends to? In other words, what do you see as your personal territory or turf?

The Findings:

On Heavy Traffic Street, there is little peace and seclusion, even within the home. People struggle to retain some feeling of personal identity in their surroundings. The constant noise and vibration are a persistent intrusion.

> "One aspect of the street is secluded, but traffic reduces it. It is also impersonal and public."

The Heavy Traffic Street resident's sense of personal territory does not extend into the street. Most people interviewed limit it to their own apartments. One person confined it even further.

-- Do you feel this is your real home, where you belong? "Definitely not. It's hard to say where we feel our home is."

6. HOME TERRITORY AND PRIVACY:

As traffic increases, people regard their street less as their home territory and more as a public, unorganized place -- an arena.

Conditions that need noting are intensity in motorized vehicles people feel they have sufficient privacy on their streets and whether they consider their street to be their own territory, such as:

- If an obstacle frustrates your street, would you defend it? 'Why, no why not?'

- Do you think of this street as your seat home, where you really belong?

- Where do you feel that your 'home' ends? To other people, how do you act as your personal territory or back?

The Finding:

On heavy traffic streets, there is little need for socializing, even within the home. People struggle to retain some feeling of personal identity in their surroundings. The commuter views the village as a prestigious institution.

'On major of the street is neglected, but traffic engulfs it. It is also impersonal and public.'

The busy traffic street relatively sense of personal territory does not extend into the street. Most people impersonal until it to their own territory. The urban resident is open territory.

- Do you feel this is your real home, where you belong? 'Definitely not. It's hard to say where we feel our home is.'

-- Where do you feel your home extends to?
"Just this apartment ... not even that."

People living on Moderate Traffic Street are more likely to include all or part of the street in their home territory. The general reaction to the street is favorable, especially among middle-aged residents. Pride in their homes and in their street is evident.

Individual privacy is high on Light Traffic Street. In a tightly knit community, such as the one on Light Traffic Street, street life tends to intrude into people's homes. The residents, however, have achieved a good balance. They manage to maintain household privacy and yet contribute to the sense of community.

> "Street life doesn't intrude into my home. Only happiness comes in from the street."

> "I am aware of the street life, but it's not an intrusion into my home."

Children and young people often prefer that their street not be secluded. They like to be part of things. They hate to be cut off from the "action". Light Traffic Street is well placed in relation to other facilities. A satisfactory balance has been achieved between a feeling of privacy and seclusion and contact with the outside world.

> "It feels secluded. In a way it is close to everything and yet has its own people."

People interviewed on Light Traffic Street tend more strongly to consider all or part of the street as a part of their "home".

— Where do you feel your home ownership lie?
'Just this apartment ... not even that.'

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People interviewed on Light Traffic Street tend more strongly to consider all or part of the street as a part of their 'home'.

Almost half of them include the whole street in their home territory.

"I feel my home extends to the whole block."

"I definitely think of it as my real home."

The contrast between the territorial restrictiveness of those living on Heavy Traffic Street and the territorial expansiveness of those living on Light Traffic Street is one of the more important findings of this study.

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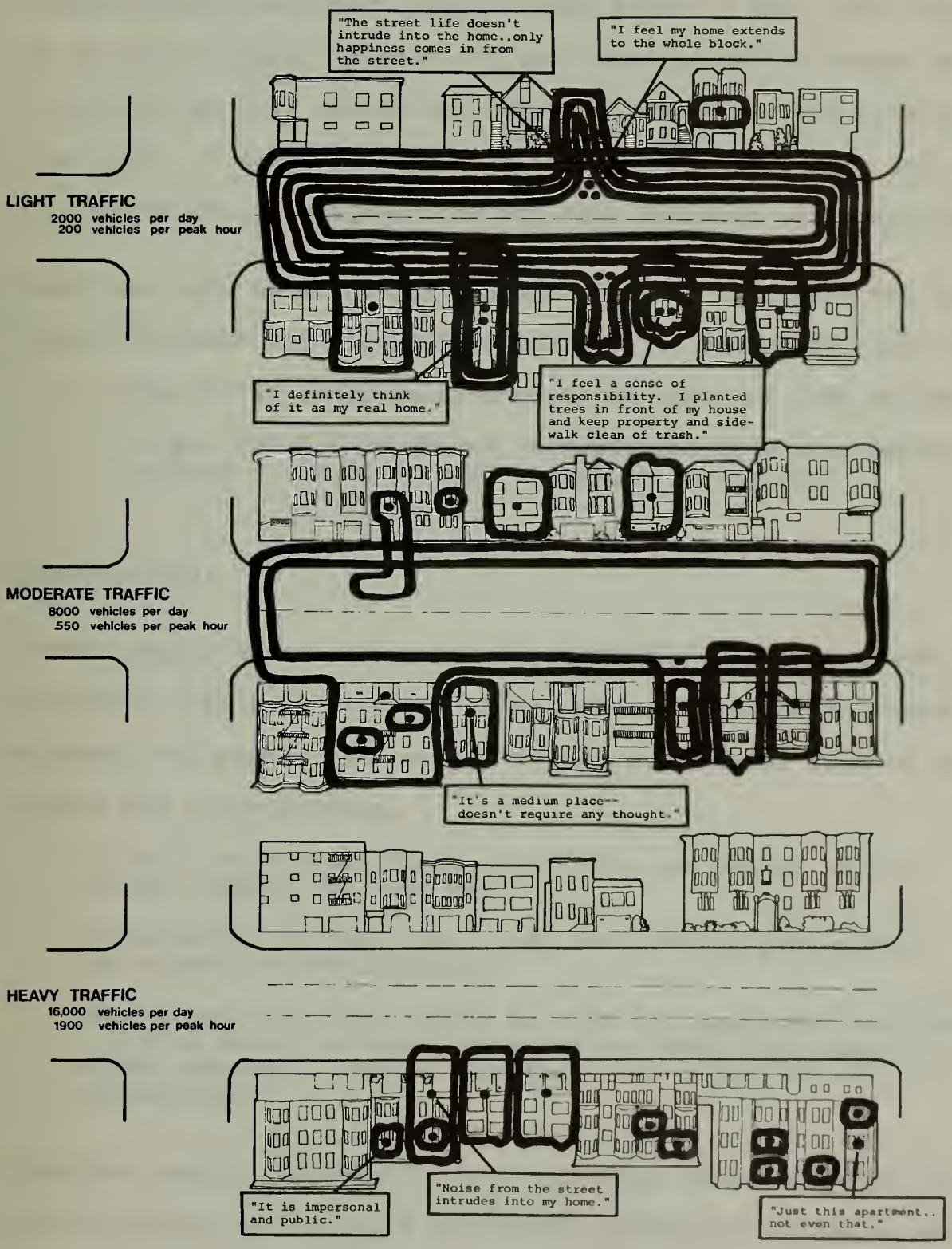
STREET LIVABILITY STUDY: A SURVEY OF HOW RESIDENTS VIEW THEIR STREETS



HOME TERRITORY

LINES SHOW AREAS PEOPLE INDICATED AS THEIR "HOME TERRITORY"

E. IDENTITY AND INTEREST

People interviewed were asked to draw a map of what they think of as their street, showing all the features of the street and the buildings they notice and remember, no matter how trivial they seem. A composite was made summarizing these maps and showing the number of times street and building features were mentioned.

Questions were asked during the interview to determine the street's visual interest and distinctiveness for its residents, such as:

-- What first comes to mind when you think of your street?

-- Do you think this street is different from surrounding streets -- is it special or unique in any way?

The Findings:

Heavy Traffic Street is seen overwhelmingly as a continuous traffic corridor -- straight-sided, without a break for cross streets, and packed with cars. People interviewed find it monotonous and uninteresting.

> "I am bored because there is no life, no people on the street, nothing to look at."
>
> "Physically, it feels as if you are looking over a void, the street is non-existent."
>
> "The first thing that comes to mind are apartment buildings ... This wasn't so until 10 years ago when they made the street one-way. Before that there was a feeling of neighborhood."

Moderate Traffic Street also has a traffic corridor image, but with accurate detailing of driveways, pedestrian crossing and road markings. A few building details are also recorded.

c. Identity and Interest

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Moderate traffic street also has a traffic carrying image, but with numerous examples of driveways, penetration crossing and road markings. A few building details are also remembered.

> "Medium sort of little block ... half way street from here to there."
>
> "It's all dull, which is what I seek."

People interviewed on Light Traffic Street seem to be aware of many facets of the physical environment. It has special appeal for children who recalled individual buildings, front yards, steps, parked cars belonging to friends and relatives, a manhole cover, telephone pole and even the brickwork setting around the base of a tree. Many of these features are encountered during their play on the street. Middle-aged people recalled a combination of details of buildings, the sidewalk and the roadway. The street is seen as a collection of individual buildings with detailed differences in front yards and porches. Their image of the street is more an impression than a set of precise recollections

> "A variety of people -- all ages. People sit on front steps and chat, visit other people. It's a comforting block, very cheerful."

"Making sure of little kids ... half my career from 1 to three.

It's all dull, which is what I seek."

Maggie interviewed on Light Traffic Street also to be aware of many facets of the pre-school environment. It has special appeal for children who typified individual buildings, from pre-school, edge, placed each belonging to friends are relaxing, a medical corner, kitchen role and even the pinkness setting reminds the home of a type. Many of these features are accessories beside their play on the street. Middle-aged people exercised a combination of details of realities, the elements and the geology. The street is seen as a collection of individual buildings with detailed differences in front yards and positions. There jump in the street is more an impression than a set of precise specifications.

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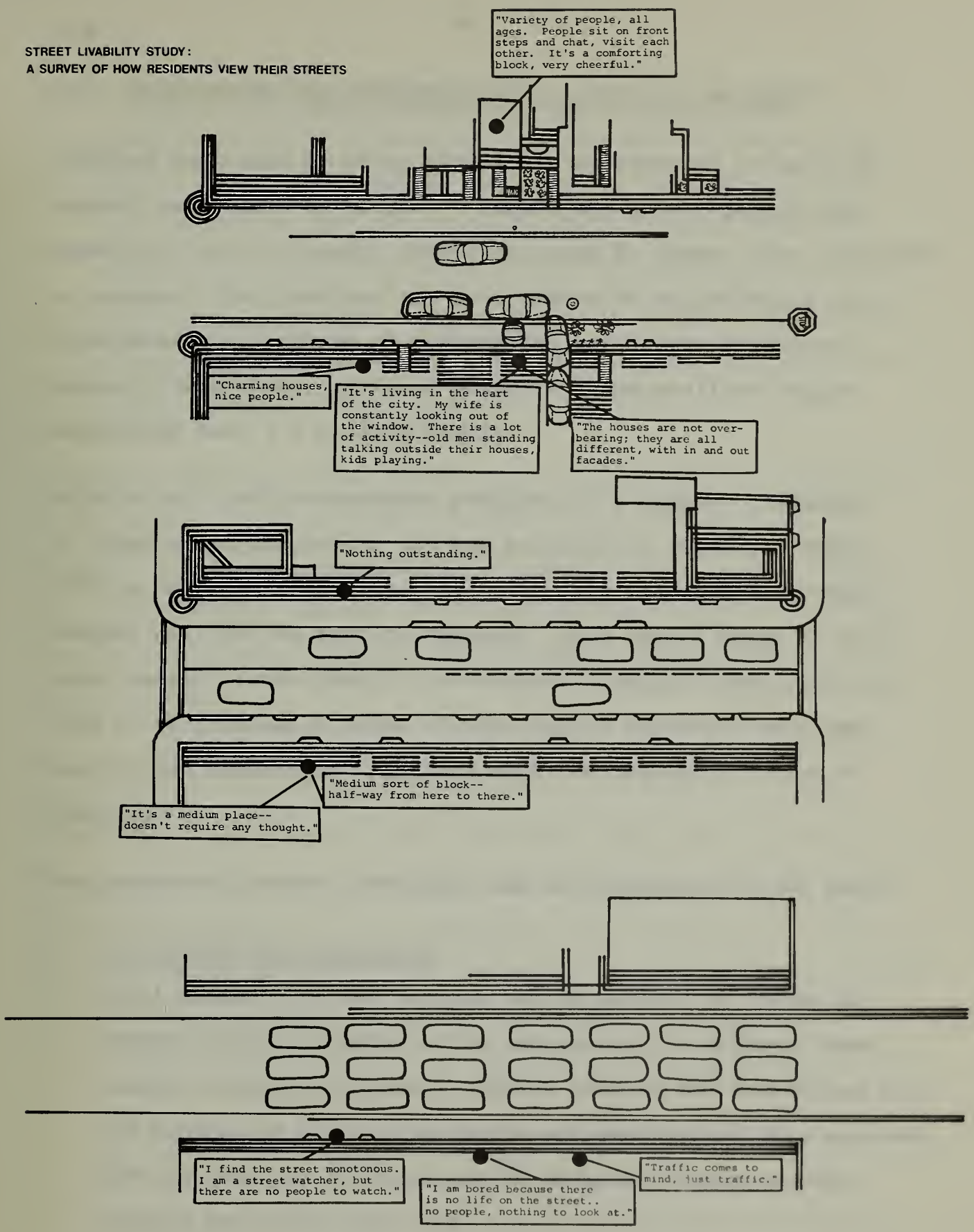

IDENTITY AND INTEREST

COMPOSITE OF MAPS PEOPLE DREW OF THEIR STREETS

LINES INDICATE NUMBER OF TIMES FEATURE WAS DRAWN BY RESIDENTS

III. CONCLUSIONS AND RECOMMENDATIONS: WHAT CAN BE DONE?

Problems generated by heavy traffic on residential streets are caused, basically, by people -- people who drive, people who depend on public transit, people who need to travel from one place to another. The problems are by-products of an affluence that encourages the purchase of automobiles and of San Francisco's magnetic attractions as focal point of a metropolitan region containing over 4.5 million people.

Solution of traffic-generated problems is a complex procedure. It affects all people who use San Francisco's streets. People must be willing to make changes in the way they travel. These changes will not be easy to achieve. This report hopes to convince people of the need to re-evaluate transportation policies from an environmental point of view and to determine what corrective and preventive actions might be required in street planning.

The problem of street livability may be approached in two ways:

A. Corrective and preventive:

Small scale, detailed actions can be applied to reduce or prevent through traffic or to ameliorate its effects where traffic cannot be reduced. Street closing and narrowings and the bending of street alignments are examples of this approach. Such actions can be taken now on an ad hoc basis on many streets throughout the city.

III. CONCLUSIONS AND RECOMMENDATIONS - WHICH WAY OUT?

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A. Corrective and preventive

Small scale, detailed actions can be applied to reduce or prevent thrown traffic or to ameliorate its effects where traffic cannot be reduced. Street closing and barricades and the routing of street automobiles are examples of this approach. Such actions can be taken now on an ad hoc basis on many streets throughout the city.

B. Reduction and Channelization:

Citywide, comprehensive efforts can be made to reduce the number of cars operating in the city and to channel traffic onto designated arterial streets. This involves improving public transit and preventing through traffic from reaching its destinations via local, residential streets. The capacity of some major arterials would be increased to handle through traffic diverted from residential streets.

Ideally, these two approaches would be applied simultaneously and immediately. It is unlikely, however, that the comprehensive approach can be put into effective operation in the near future. The smaller-scale approach can be applied much sooner and at less expense. Residents suffering along problem streets should not be asked to wait.

A. Corrective and Preventive Action

Residents interviewed for this study had many good suggestions for correcting problems on their streets. These, together with additional proposals by the consultant, are listed here. Many are small-scale and relatively inexpensive. They could be applied to residential streets throughout the city.

1. Where traffic speeds are excessive, they can be controlled by phased traffic signals times for desirable speeds.

2. The effectiveness of signs for regulating traffic is increased by making them larger and more distinctive. Placing them in more prominent locations also helps.

3. Narrowing the street, especially at entrances to blocks, helps to slow traffic. Drivers realize that the street

f. Redirection and Channelization

Citywide, comprehensive efforts can be made to reduce the number of cars operating in the city and to channel traffic onto designated arterial streets. This involves improvement public transit and preventing through traffic from penetrating residential neighborhoods via local, residential streets. The capacity of some major arterials would be increased to handle through traffic diverted from residential streets.

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h. Corrective and Preventive Zoning

Residents interviewed for this study had many good suggestions for correcting problems on their streets. These, together with additional proposals by the consultant, are listed here. Many are small-scale and relatively inexpensive. They could be applied to residential streets throughout the city.

1. When traffic speeds are excessive, they can be controlled by phased traffic signals timed for desirable speeds.

2. The attractiveness of alternate routes carrying traffic is increased by making them larger and more distinctive, giving them improvement treatment and signs.

3. Narrowing the street, especially at entrances to minor, helps to slow traffic. Drivers realize that the street

is not a fast, or "go", street. Small, public open spaces are created in the widened portions of the sidewalks.

4. Shifting and bending the alignment of the street also discourages fast speeds.

5. Bumps or ridged surfaces that are uncomfortable to drive over at fast speeds can be placed at entrances to blocks. This device is especially effective in discouraging hot-rodders.

6. The organization of sidewalks, street furniture and landscaping to create a clearly residential character can, in a more subtle manner, assist in slowing down traffic.

7. Closing the street at the ends or in the middle of blocks can be done to create pleasant cul-de-sacs in many locations. Precautions must be taken to maintain effective emergency services -- fire, police and ambulance.

8. Reducing the number of traffic lanes can reduce traffic volumes and speed.

9. Trees planted along sidewalks screen traffic from many windows and separate sidewalks from the street.

10. On very busy residential streets, low walls or landscaping can discourage children from running into the street and impart a sense of protection from traffic.

11. Clearly defined, well-lighted pedestrian crossings can alert both pedestrians and drivers to potential danger.

These ideas can be used to correct or, at least, to ameliorate conditions on existing problem streets and to prevent "auto blight" happening on others. Improvements of these kinds do not happen by themselves. They require concerted public actions and a willingness to experiment with new ideas.

B. Traffic Reduction and Channelization

To halt the environmental corrosion of residential neighborhoods, traffic must be concentrated on the city's main arterials. This

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4. Traffic Reduction and Channelization

To make the environmental correction of residential neighborhoods, traffic must be concentrated on the city's main arteries. This

requires both increasing the capacity of some arterial streets and leveling-off, if not reducing, the number of automobiles in use in the city. The latter action is essential if the former is to be effective for more than a few years. Extensive improvements in the public transit system are required. Measures increasing the cost of operating automobiles both into and within the city are necessary, e.g., increasing bridge tolls, a tax on parking facilities, and increasing the amount and cost of metered parking. Limiting the number of autos that come into the city to the capacities of present bridge and freeway approaches is essential.

Enlarging the capacity of arterial streets is costly. Routing traffic onto local, residential streets costs less in dollars, but much, much more in human inconvenience and suffering. There is no way to place a price tag on the human cost of not taking corrective action. The Street Livability Study shows how large that cost actually is. The citizens of San Francisco have to decide which is of greater importance: residential amenity or traffic efficiency.

When increasing arterial street capacity, two major principles must always be observed:

1. Traffic on residential streets adjacent or parallel to arterial streets must be permanently reduced. This reduction must be planned before or at the same time as the increase of traffic on the arterial.

EXAMPLE: With an increase in Van Ness Avenue's capacity, such as by below-grade expansion, traffic on the residential sectors of Franklin and Gough could be reduced by sidewalk

requires both increasing the capacity of some arterial streets and improving traffic flow generally, the number of automobiles in use in the city. The latter action is essential if the former is to be achieved for more than a few years. Extensive improvements in the public transit system are required. Measures increasing the cost of operating automobiles both into and within the city are necessary, e.g., increasing bridge tolls, a tax on parking facilities, and increasing the amount and cost of off-street parking. Limiting the number of autos that come into the city is the essential of proposal tolls and freeway approaches.

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When considering arterial street capacity, two major principles must always be observed:

1. Traffic on secondary arterial streets adjacent or parallel to primary arterial streets must be permanently reduced. This reduction must be planned before or at the same time as the increase of traffic on the arterial.

EXAMPLE: With an increase in Van Ness Avenue's capacity, such as by below-grade expansion, traffic on the residential streets of Franklin and Gough could be reduced by diverting

widenings, and a reduction in the number of traffic lanes. A section of Franklin and Gough Streets might be blocked so through traffic is impossible. Only through this sort of trade-off is the effort to increase arterial capacity justified.

2. An increase in the traffic capacities of arterial streets must be accompanied by protective buffering of adjacent areas -- particularly residential areas.

EXAMPLE: Park Presidio and Sunset Boulevard are excellent examples of existing, good screening of residential areas from arterial streets.

Keeping arterial street traffic from overflowing onto parallel streets requires more definite measures than merely increasing arterial street capacity. Such measures include closing ends of streets, "necking down" the entrances to blocks and restrictive signalization and turning movements. Actions of this kind can be done on an ad hoc basis, in response to local problems. An overall, coordinated citywide program is desirable, but not essential.

People may have to accept more congestion on major arterials until they adjust to new ways of moving about the city. It is important to keep buses and trolleys clear of traffic congestion. This can be accomplished by designating special bus lanes, by transit-activated, pre-emptive traffic signals, and by streets limiting turning movements. If a leveling-off or reduction in the number of cars is to be achieved, all aspects of public transportation

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must be improved. An expanded Muni subway system and more comfortable, quieter buses are essential.

The Street Livability Study discloses the negative effects of traffic on a residential community. Residential streets throughout the city are becoming clogged, unsafe and polluted by ever-increasing numbers of vehicles. A sense of loss is evident in the reactions of residents on these streets. The erosion is subtle and slow. No clear target for resentment is apparent. No government agency, no private developer can be singled out for blame. People who, as drivers, are part of the problem are, as street residents, those it most affects.

All too often, people are apathetic because they do not expect their efforts to change things and to improve them. The effects of traffic on residential streets cannot be erased easily or quickly. But, the effort should be made, now, before conditions deteriorate further. San Francisco is a city that has always taken great pride in the high quality of its residential environment This quality need not be compromised.

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The Greenbelt Study discloses the crippling effects of traffic on a residential community. Residential streets throughout the city are becoming clogged, unsafe and polluted by ever-increasing numbers of vehicles. A sense of loss is evident in the reactions of residents on these streets. The erosion is subtle and slow. No clear target for investment is apparent. No government agency, no private developer can be singled out for blame. People who, as drivers, are part of the problem are, as street residents, those it most affects.

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